RENEWABLE ENERGY AND ELECTRICITY: CREATING JOBS, SAVING CONSUMERS MONEY, AND INCREASING OUR ENERGY SECURITY

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BEFORE THE
HOUSE COMMITTEE ON ENERGY AND COMMERCE
SUBCOMMITTEE ON ENERGY AND AIR QUALITY

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I. Introduction

The Union of Concerned Scientists (UCS) is a nonprofit organization of more than 60,000 citizens and scientists working for practical environmental solutions. For more than two decades, UCS has combined rigorous analysis with committed advocacy to reduce the environmental impacts and risks of energy production and use. Our Clean Energy Program focuses on encouraging the development of clean and renewable energy resources, such as solar, wind, geothermal and bioenergy, and on improving energy efficiency.

We favor the adoption of policies to increase the use of renewable energy resources in our nation's electricity generation mix. Such policies are needed to meet our future electricity needs, diversify our electricity supply, reduce the vulnerability of our energy system, stabilize electricity prices, and protect the environment. Specifically, we endorse a renewable electricity standard, also known as a renewable portfolio standard (RPS) -- a market-based mechanism that requires utilities to gradually increase the portion of electricity produced from renewable resources.

The United States is blessed by an abundance of renewable energy resources from the sun, wind, and earth. The *technical* potential of good wind areas, covering only 6 percent of the lower 48 state land area, could theoretically supply more than one and a third times the total current national demand for electricity. We have large untapped geothermal and biomass (energy crops and plant waste) resources. Of course, there are limits to how much of this potential can be used *economically*, because of competing land uses, competing costs from other energy sources, and limits to the transmission system. The important question is how much it would cost to supply a specific percentage of our electricity from renewable energy sources. As this testimony will show,

analyses by both UCS and EIA demonstrate we could generate at least 20 percent of our electricity from renewable energy sources by 2020, in addition to our existing hydro resources, while reducing prices for both electricity and gas customers.

In this testimony, I will review the evidence that shows that increasing renewable energy will save money for consumers, improve energy and national security, create jobs and income for American farmers and workers, improve the environment and reduce financial risks for utilities. I will also address why an RPS, along with other policies, is necessary to achieve these benefits, and why continuing to rely only on voluntary and state efforts will impose higher costs on families and businesses, weaken energy security, and harm the environment for all Americans. Finally, I will offer our recommendations and comments on specific sections of the discussion draft as they pertain to renewable energy.

II. Renewable energy can reduce natural gas and electricity prices.

Energy is critical to our economy. Stephen Brown, director of energy economics at the Dallas Federal Reserve Bank, notes that "nine of the 10 last recessions have been preceded by sharply higher energy prices."

Today's high natural gas prices, caused in part by a boom in natural gas power plant construction, are causing economic harm. In the February 11, 2005 release on the Short-Term Energy Outlook, the Energy Information Administration (EIA) found that the average Henry Hub natural gas spot price was $6.32 per Mcf in January. EIA estimates spot prices at Henry Hub will average $5.45

per Mcf in 2005 and $5.77 in 2006. These natural gas prices today are more than double their 1990's levels.

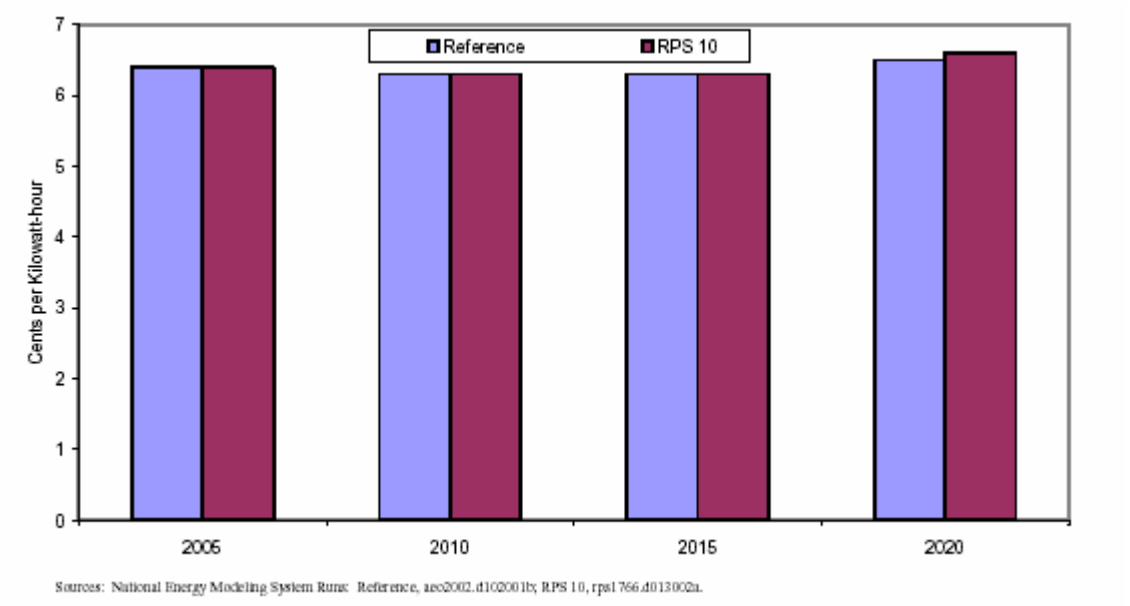
Because natural gas accounts for about 90 percent of the costs of fertilizer, escalating prices have put farmers under a severe economic hardship. Some manufacturing facilities and industrial users that rely heavily on natural gas have already had to reduce operation or move their factories overseas. On February 17, 2004, *The Wall Street Journal* reported that the US petrochemical industry, which is heavily dependent on natural gas for a primary feedstock as well as for fuel, has lost approximately 78,000 jobs to foreign plants where the natural gas is much cheaper.

Natural gas prices show no signs of returning to historic levels. EIA has raised its forecast of long-term natural gas prices has increased for each of the last seven years. Moreover, a recent Lawrence Berkeley Lab study has found that EIA's gas forecasts have been and continue to be at least 50 cents/mmBTU lower than market forecasts, based on gas futures contracts.

Renewable energy can help reduce the demand for natural gas and lower gas prices. On January 5, 2005, the Lawrence Berkeley National Laboratory (LBL) released a review of 13 studies and 20 specific analyses using different computer models and different assumptions. The analyses all confirmed that renewable energy (and energy efficiency) can reduce gas demand and put downward pressure on natural gas prices and bills by displacing gas-fired electricity generation. They found that the higher the level of renewable energy penetration, the more gas is saved, and the more gas prices are reduced. The LBL study also shows how these results are broadly consistent with economic theory, with results from other energy models, and with limited empirical evidence. Many of the analyses LBL reviewed were conducted by EIA and by UCS.

Even in 2002, when gas prices and price projections were considerably lower than they are today, an EIA analysis conducted at the request of Senator Frank Murkowski (R-AK) showed that a 10 percent renewable electricity standard like the one that subsequently passed the Senate would have a negligible impact on electricity prices. EIA found only a one mill (one tenth of one cent) per kWh increase in 2020 with a 10 percent RPS, and no impact in most years. When gas savings were considered, total electricity and gas bills were found to be as much as $13.2 billion lower with the 10 percent RPS (2000 dollars, 8 percent discount rate).

Figure 1. Retail Electricity Prices in the EIA Reference and RPS 10 Cases, 2002

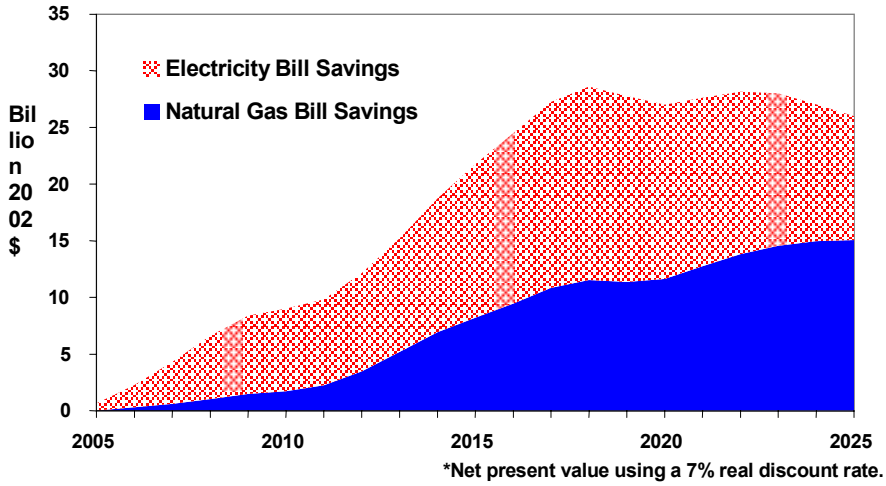


Energy Information Administration, *Impacts of a 10-Percent Renewable Portfolio Standard,* SR/OIAF/2002-03, February 2002. Figure 5, p. 20

In April 2004, with the assistance of the Tellus Institute, we ran NEMS with no changes to the model, using all EIA assumptions. Because of the higher EIA gas price projections, the results showed that even an RPS of 20 percent by 2020 would reduce electricity and gas prices. Cumulative savings to electricity customers under a 20 percent RPS totaled $11 billion (net present

value) by 2025, with cumulative savings to gas consumers of an additional $14 billion, for a $25 billion total savings (Figure 2).

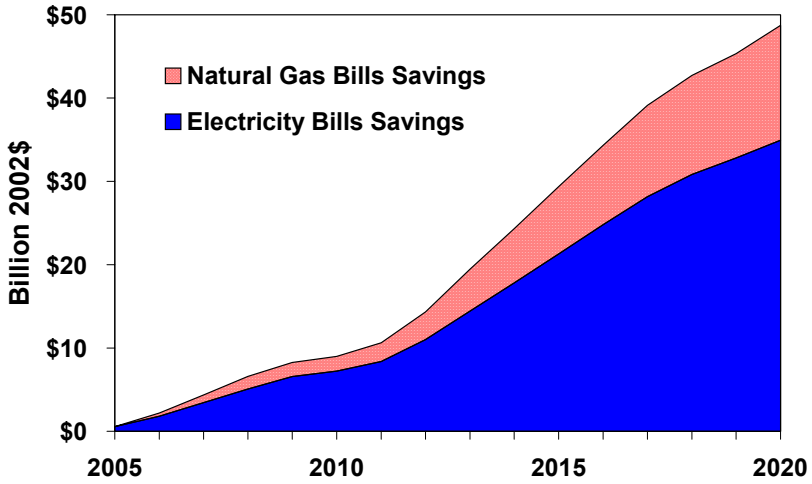
Figure 2. Cumulative Natural Gas and Electricity Bill Savings* (20% by 2020 RES)



EIA uses very pessimistic projections of renewable energy technology costs. The model also imposes artificial limits on renewable energy penetrations, and arbitrarily high costs at increasing levels of renewable penetration. We have therefore tested the result of using cost projections closer to (but still somewhat more conservative than) those used by the national energy labs, and penetration limits and cost estimates that based on utility studies and experience.

In our analysis, the consumer savings nearly doubled to $49 billion, with $35 billion in electricity savings, and $14 billion in gas savings (Figure 3).

Figure 3
Cumulative Natural Gas and Electricity Bill Savings (20 percent by 2020 RES)[a]



[a]Excludes transportation.

The most important conclusion, however, is that whether you believe that EIA's pessimistic projections of renewable energy costs are more likely, or the national lab projections, the analyses show that a 20 percent RPS would save both electricity and natural gas consumers money in either case.

A 10 percent renewable standard would save money too, but not as much. In our analysis we found that with a 10 percent renewable standard by 2020, electricity and gas consumers would save almost $20 billion, compared to $49 billion under the 20 percent standard. Residential consumers could save an estimated $5.8 billion on their energy bills by the year 2025. Commercial and industrial customers would be the biggest winners saving a total of $13.8 billion between them.

III. Renewable energy can improve energy and national security.

In response to rising gas prices, and the declining productivity of North American gas wells, imports of LNG are projected to increase by sixteen fold over the next 20 years. This trend—assuming that the LNG infrastructure can be expanded sufficiently—threatens to push America down the same troubled road of rising dependence on imported gas that we have followed for oil.

By reducing the demand for natural gas, renewable energy can reduce the pressure for increasing imports. Energy from the wind, sun, and heat of the earth are America's most abundant resources. They can never be depleted.

Renewable energy can increase energy and national security in other ways as well. Lacking long fuel supply chains, renewable energy facilities are not vulnerable to supply disruptions, and the price shocks they can cause. Because they do not use volatile fuel or produce dangerous wastes, renewable energy facilities (except large hydropower dams) do not present inviting targets for sabotage or attack.

IV. Renewable energy can create jobs and incomes for American farmers and workers.

Renewable energy can help improve our national economy. Investments in indigenous renewable energy sources keep money circulating and creating jobs in regional economies. Renewable energy can greatly benefit struggling rural economies, by providing new income for farmers and rural communities. It can also benefit manufacturing states, even those with less abundant renewable resources, by providing them the opportunity manufacture and assemble components for renewable energy facilities. And renewable energy can create enormous export opportunities, given the growing commitment of the rest of the world to expand use of renewable energy.

With the assistance of consultant Marshall Goldberg, we ran the results of our NEMS runs through the IMPLAN input-output model of the U.S. economy, and found that a 20 percent RPS by 2020 would produce:

- More than 355,000 new jobs in manufacturing, construction, operation, maintenance, and other industries, nearly twice as many jobs as producing the same amount of electricity from fossil fuels—a net increase of nearly 157,500 jobs by 202
- An additional $8.2 billion in income and $10.2 billion in gross domestic product in the United States' economy.
- $72.6 billion in new capital investment
- $15 billion in payments to farmers and rural areas for producing biomass energy
- $5 billion in new property tax revenues for local communities
- $1.2 billion in wind power land lease payments to farmers, ranchers, and rural landowners.

Renewable energy sources are available in every state. They are much more broadly dispersed than our fossil fuel resources. Under a national renewable electricity standard, some states will obviously reap more benefits than others, but virtually every state should be able to increase its use of its own resources, build its local economy, and be less dependent on importing energy from other states and countries.

Recent analysis by the Renewable Energy Policy Project (REPP) found that the economic benefits are not localized to the states that have the most renewable energy resources. REPP examined the capability of the manufacturing industries in each state to supply components for wind and solar facilities. They found that the top 20 states for wind component manufacturing would be California Ohio, Texas, Michigan, Illinois, Indiana, Pennsylvania, Wisconsin, New York, South Carolina, North Carolina, Tennessee, Alabama, Georgia, Virginia, Florida, Missouri, Massachusetts, Minnesota, and New Jersey. The top twenty states for solar manufacturing would be California,

Texas, Arizona, New York, Pennsylvania, Massachusetts, Illinois, Ohio, Oregon, Florida, North Carolina, New Jersey, Colorado, Washington, Virginia, Indiana, Michigan, Minnesota, New Mexico, and Missouri.

V. Renewable energy can improve our environment and reduce financial risks to utilities.

Electricity use has a significant impact on the environment. Electricity accounts for less than three percent of US economic activity. Yet, it accounts for more than 26 percent of smog-producing nitrogen oxide emissions, one-third of toxic mercury emissions, some 40 percent of climate-changing carbon dioxide emissions, and 64 percent of acid rain-causing sulfur-dioxide emissions. Renewable energy can reduce these emissions, thereby reducing the cost of hitting any emission caps.

Our analysis found that a 20 percent renewable electricity standard could reduce the projected growth in power plant carbon dioxide emission by more than 50 percent by 2025. Because the 20 percent renewable standard would save money for electricity and gas consumers, these are free (or negative cost) carbon reductions. They represent free insurance against the risk that power plants—the largest source of carbon emissions in the U.S. economy—may have to reduce those emissions someday.

Even most utility executives believe that they will have to implement carbon reductions eventually. Yet in response to the increase in natural gas prices, more than 100 new coal-fired power plants have been proposed. These plants will expose their owners, power purchasers, and customers to the risk of future price increases that could be avoided by investing in renewable energy instead.

Indeed, under an economy-wide cap-and-trade approach, the carbon reductions from increasing renewable energy will save money for every sector of the economy.

Whether you think that risk of climate change is great or small, increasing renewable energy can reduce the risk of responding to it. And renewable energy reduces emissions of sulfur dioxide, nitrogen oxides, particulates, and mercury, reducing the cost of complying with emission reduction requirements for these pollutants as well.

VI. Why a renewable portfolio standard?

If increasing renewable energy would save consumers money, why aren't utilities switching to renewables? In fact, a few are beginning to invest in wind energy as a purely economic proposition. Others are financing renewable energy development by allowing customers to volunteer to pay a little more for renewable energy. But the reality is that about three-quarters of the renewable energy developed in recent years, and projected to be developed in the next decade, is the result of state renewable electricity standards.

Renewable energy has made great strides in reducing costs, thanks to research and development and growth in domestic and global capacity. The cost for wind and solar electricity has come down by 80-90 percent over the past two decades. However, like all emerging technologies, renewable resources face commercialization barriers. They must compete at a disadvantage against the entrenched industries. They lack infrastructure, and their costs are high because of a lack of economies of scale.

Renewable energy technologies face distortions in tax and spending policy. Studies have established that federal and state tax and spending policies tend to favor fossil-fuel technologies over renewable energy. A 2003 study by the Renewable Energy Policy Project showed that between 1943 and 1999, the nuclear industry received over $145 billion in federal subsidies vs. $4.4 billion for solar energy and $1.3 billion for wind energy. Another study by the non-partisan Congressional Joint Committee on Taxation projected that the oil and gas industries would receive an estimated $11 billion in tax incentives for exploration and production activities between 1999 and 2003. In addition to these subsidies, conventional generating technologies enjoy a lower tax burden. Fuel expenditures can be deducted from taxable income, but few renewable technologies benefit from this deduction, since most do not use market-supplied fuels. Income and property taxes are higher for renewable energy, which require large capital investments but have low fuel and operating expenses.

Many of the benefits of renewable resources, such as reduced pollution and greater energy diversity, are not reflected in market prices, thus eliminating much of the incentive for consumers to switch to these technologies. Other important market barriers to renewable resources include: lack of information by customers, institutional barriers, the small size and high transaction costs of many renewable technologies, high financing costs, split incentives among those who make energy decisions and those who bear the costs, and high transmission costs.

Some have called for future support of renewable energy through "green marketing," selling portfolios with a higher renewable energy content (and lower emissions) to customers who are willing to pay more for them. We strongly support green marketing as a means to increase the use of renewable energy and reduce the environmental impacts of energy use. Surveys show that many

customers are willing to pay more for renewable energy, and pilot programs have shown promising, but not overwhelming results.

Green marketing is not a substitute for sound public policy, however. There are many barriers to customers switching to green power, not the least of which is inertia. More than fifteen years after deregulation of long-distance telephone service, half of telephone customers still had not switched suppliers, even though they could get much lower prices by doing so. A 2003 study by the National Renewable Energy Laboratory projects that in an optimistic scenario, green marketing could increase the percentage of renewable energy in our electricity mix from about 2 percent today to only about 3 percent in ten years.

With green electricity, the benefits of any individual customer's choice accrue to everyone, not the individual customer. Green customers gets the same undifferentiated electrons and breathe the same air as their neighbors choosing to buy power from cheap, dirty coal plants, creating a strong incentive for people to be "free riders" rather than pay higher costs for renewable resources. People recognize this public benefits aspect of green power. While they consistently say they are willing to pay more for electricity that is cleaner and includes more renewable energy, they overwhelmingly prefer that everyone pay for these benefits to relying on volunteers. A deliberative poll by Texas utilities found that 79 percent of participants favored everyone paying a small amount to support renewable energy, versus 17 percent favoring relying only on green marketing.

Fortunately, 18 states plus the District of Columbia have enacted renewable portfolio standards. The RPS is a market-based mechanism that requires utilities to gradually increase the portion of electricity produced from renewable resources such as wind, biomass, geothermal, and solar

energy. It is akin to building codes, or efficiency standards for buildings, appliances, or vehicles, and is designed to integrate renewable resources into the marketplace in the most cost-effective fashion.

By using tradable "renewable energy credits" to achieve compliance at the lowest cost, the RPS would function much like the Clean Air Act credit-trading system, which permits lower-cost, market-based compliance with air pollution regulations. Electricity suppliers can generate renewable electricity themselves, purchase renewable electricity and credits from generators, or buy credits in a secondary trading market. This market-based approach creates competition among renewable generators, providing the greatest amount of clean power for the lowest price, and creates an ongoing incentive to drive down costs.

The states have proven that renewable electricity standards are popular and can be effective. We project that state RPS laws and regulations will provide support for more than 25,550 megawatts (MW) of new renewable power by 2017 – an increase of 192 percent over total 1997 US levels (excluding hydro). This represents enough clean power to meet the electricity needs of 17.2 million typical homes. We estimate that by 2017 these state RPS programs will also reduce carbon dioxide emissions – the heat-trapping gas primarily responsible for global warming – by 65.2 million metric tons annually. This is equivalent to taking 9.7 million cars off the road or planting more than 15.6 million acres of trees – areas approximately the size of West Virginia.

As encouraging as these state developments have been, they are not enough to capture renewable energy's potential benefits to the national economy. Under a 10 percent RPS, we would have

approximately 100,000 MW of non-hydro renewables. Under a 20 percent RPS, we would have nearly 200,000 MW of non-hydro renewables—and save consumers money.

Many people forget that we have given voluntary measures and incentives more than a fair try. The Energy Policy Act of 1992 called for increasing our renewable energy supplies by 75 percent, and enacted the production tax credit. Unfortunately, these measures have not been successful at stimulating more than very limited renewable energy development outside of states that have implemented renewable portfolio standard. It is time for a national minimum standard, on which states and volunteer efforts can continue to build.

Energy production creates national economic and environmental problems that need national solutions. A national renewables standard would establish uniform rules for the most efficient trading of renewable energy credits. This uniformity would reduce renewable energy technology costs by creating economies of scale and a national market for the most cost-effective resources.

The RPS enjoys widespread bipartisan political support. In 2002, 143 members of the House, including 21 Republicans called for including a Renewable Portfolio Standard in an energy bill. In a September, 2003 letter to the conferees, 53 Senators supported including a strong RPS in the energy bill conference report. The U.S. Senate has twice passed a RPS and the majority of Senators on the energy bill conference supported the Bingaman RPS amendment.

The RPS is the surest mechanism for securing the public benefits of renewable energy sources and for reducing their cost to enable them to become more competitive. It is a market mechanism, setting a uniform standard and allowing companies to determine the best way to meet it. The

market picks the winning and losing technologies and projects, not administrators. The RPS will reduce renewable energy costs by:

- Providing a revenue stream that will enable manufacturers and developers to obtain project financing at a reasonable cost and make investments in expanding capacity to meet an expanding renewable energy market.
- Allowing economies of scale in manufacturing, installation, operation and maintenance of renewable energy facilities.
- Promoting vigorous competition among renewable energy developers and technologies to meet the standard at the lowest cost.
- Inducing development of renewables in the regions of the country where they are the most cost-effective, while avoiding expensive long-distance transmission, by allowing national renewable energy credit trading.
- Reducing transaction costs, by enabling suppliers to buy credits and avoid having to negotiate many small contracts with individual renewable energy projects.

Some people have asked why hydropower is not eligible to earn renewable energy credits in most RPS proposals. Hydro is that it is a mature resource and technology. In most cases, it is already highly competitive. It will not benefit appreciably from the cost-reduction mechanisms outlined above, and an RPS that included hydro would likely produce small, if any, increases in hydro generation. Additionally, new dams are unlikely to be built and are environmentally questionable. Nevertheless, we have supported RPS' that include incremental hydro generation from existing dams. Now that a Low Impact Hydro Institute (LIHI) certification process with broad stakeholder

support is operating, we recommend that the definition of incremental hydro refer to incremental generation at LIHI-certified facilities.

Some people have also expressed concerns about the variable output of renewable sources like solar and wind, and believe that an RPS would affect the reliability of our energy system. However, the electric system is designed to handle unexpected swings in energy supply and demand, such as significant changes in consumer demand or even the failure of a large power plant or transmission line. Solar energy is also generally most plentiful when it is most needed—when air-conditioners are causing high electricity demand. There are several areas in Europe, including parts of Spain, Germany, and Denmark, where wind power already supplies over 20 percent of the electricity with no adverse effects on the reliability of the system. In addition, several important renewable energy sources, such as geothermal, biomass, and landfill gas systems can operate around the clock. Studies by the EIA and the Union of Concerned Scientists show these non-intermittent, dispatchable renewable energy plants would generate about half of the nation's non-hydro renewable energy under a 10 percent RPS in 2020. Renewable energy can increase the reliability of the overall system, by diversifying our resource base and using supplies that are not vulnerable to periodic shortages or other supply interruptions.

A summary of studies presented at the European Wind Energy Conference in June, 2003 indicate that the impacts and costs for large scale wind generation on the power grid are relatively low at penetration rates that expected over the next several years. For example, one 2003 study by PacifiCorp estimated that the additional costs of integrating 2000 MW of renewables – nearly 20 percent of its system capacity – was between 0.5 and 0.6 cents per KWh. In fact, the PacifiCorp 2003 least cost plan included 1400 MW of wind capacity.

VII. Additional policies are needed.

A number of complementary policies should be enacted to reduce market barriers to renewable energy development:

- Extending production tax credits of 1.8 cents per kWh and expanding them to cover all clean, renewable resources (excluding hydropower)
- Adopting national net metering standards, allowing consumers who generate their own electricity with renewable energy systems to feed surplus electricity back to the grid and spin their meters backward, thus receiving retail prices for their surplus power production
- Increasing spending on renewable energy research and development

The deployment of all these policy solutions will be required to truly level the playing field for renewable energy. It is especially important that the Production Tax Credit be extended for a period of at least five to ten years, to provide predictability and price stability in the renewables industry, and avoid the costly boom-bust cycles created by the recent history of short-term extensions.

The PTC should be extended for all renewable energy technologies. The Administration's recent budget assumed that the geothermal energy credit included in the last extension would now be dropped. Geothermal can play an important near-term role in reducing the demand for gas, especially in the Western states that have experienced significant price volatility in recent years.

Net metering is essential for customers who invest their own money in renewable energy in their buildings get fairly compensated for excess electricity they produce. Net metering is not sufficient to promote renewable energy development, but it is essential to promote the use of clean, distributed resources like solar energy.

Additionally, we urge Congress to pass a suite of policies to improve energy efficiency, including both demand-side efficiency and supply-side efficiency, such as providing incentives for combined heat and power plants. The LBL study and many others have found that energy efficiency is the least expensive way to reduce natural gas demand and natural gas prices.

VIII. Comments on the Provisions of the Discussion Draft

In our view, the provisions of the Discussion Draft fail to provide the long-term incentives to increase the deployment of renewable energy. We have outlined numerous studies that demonstrate that increasing the deployment of renewables will yield substantial benefits to consumers, create jobs and help clear our air. Yet without any demand side incentive such as the Renewable Portfolio Standard that we have outlined in our testimony, we fear this effort to increase the use of renewable energy falls far short of the potential. For example, we believe that production tax credits for renewables should be extended at least ten years and apply to as broad a spectrum of renewables as possible.

Similarly, we are gratified by the net metering provisions in the Draft, but we suggest that these provisions be mandatory – not merely suggested changes. We have uniformity governing the use

of such things as phones throughout the country. We recommend similar uniformity apply to such things as solar panels and other forms of distributed generation.

Finally, in our view, the level and variety of subsidies provided for oil, gas, "clean coal" and nuclear energy appears grossly out of balance with the incentives for renewables, considering the costs and the benefits. We believe that studies demonstrate that the costs for renewable energy are low and the benefits are both long term and substantial. We ask that the Committee consider dramatically increasing the variety of demand-side incentives for renewables to present a more balanced energy policy.

IX. Conclusion

Survey after survey has shown that Americans want cleaner and renewable energy sources, and that they are willing to pay more for them. A survey conducted in 2002 by Mellman Associates found that when presented with arguments for and against a 20 percent RPS requirement, 70 percent of voters support an RPS, while only 21 percent oppose it.

The combination of EIA and UCS studies demonstrate that with appropriate policies, renewable energy technologies can provide Americans with the clean and reliable electricity they desire, while also saving them money, contributing to our nation's energy security and achieving significant reductions in harmful emissions.

The net metering and renewable energy production incentive provisions included in the current draft bill before the committee are laudable and deserving of support. But by themselves, these

provisions will not get the job done. A strong, market-friendly renewable energy standard is required to realize the full potential of America's renewable energy resources.

For all of these reasons, we respectfully urge that as the Committee moves forward with its development of national energy legislation, you support inclusion of a renewable portfolio standard.

Thank you.